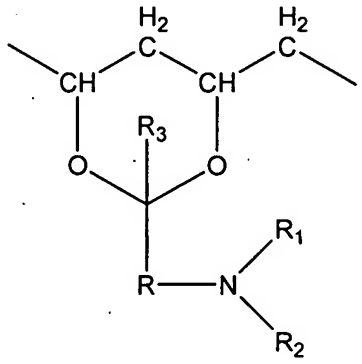
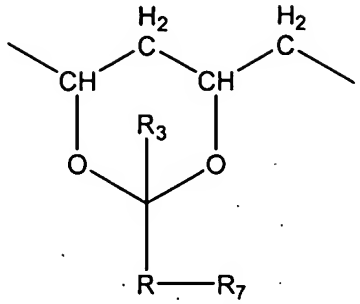
What is claimed is:

1. A polymerizable material for making an ophthalmic device, comprising: a water-soluble polyvinyl alcohol having crosslinkable groups; and a modifier in an amount sufficient to improve one or more physical properties of the ophthalmic device made from the polymerizable material, wherein the one or more physical properties are selected from the group consisting of stress at break (N/mm^2), percentage of elongation at break, toughness or energy to break (N·mm), and susceptibility to fracture.
2. A polymerizable material of claim 1, wherein said modifier is selected from the group consisting of nanoparticles having a hydrophilic surface, a copolymer having hydrophobic groups or units for imparting at least one desired physical property to said ophthalmic device and hydrophilic groups or units in an amount sufficient to render the copolymer miscible with the polyvinyl alcohol, and mixtures thereof.
3. A polymerizable material of claim 2, wherein said water-soluble polyvinyl alcohol is a polyhydroxyl compound which has a weight average molecular weight of at least about 2000 and which comprises from about 0.5 to about 80%, based on the number of hydroxyl groups in the poly(vinyl alcohol), of units of the formula I, I and II, I and III, or I and II and III



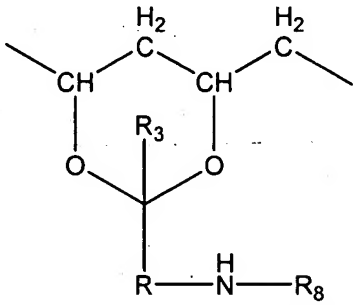
I

in which R is alkylene having up to 12 carbon atoms, R_1 is hydrogen or lower alkyl, R_2 is an olefinically unsaturated, electron-withdrawing, crosslinkable radical having up to 25 carbon atoms, and R_3 is hydrogen, a C_1 -C_6 alkyl group or a cycloalkyl group,



II

wherein R and R_3 are as defined above, and R_7 is a primary, secondary or tertiary amino group or a quaternary amino group of the formula $N^+(R')_3X^-$, in which each R', independently of the others, is hydrogen or a C_1 -C_4 alkyl radical and X is HSO_4^-, F^-, Cl^-, Br^-, I^-, CH_3COO^-, OH^-, BF^-, or $H_2PO_4^-$,



III

in which R and R_3 are as defined above, and R_8 is the radical of a monobasic, dibasic or tribasic, saturated or unsaturated, aliphatic or aromatic organic acid or sulfonic acid.

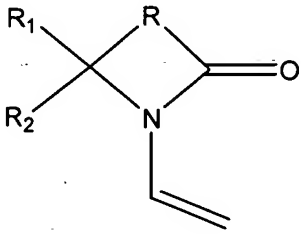
4. A polymerizable material of claim 3, wherein said water-soluble polyvinyl alcohol is a polyhydroxyl compound which has a molecular weight of at least about 2000 and which comprises from about 0.5 to about 80%, based on the number of hydroxyl groups in the poly(vinyl alcohol), of units of the formula I, wherein R_2 is a radical of formula IV or formula V

$$-CO\text{-}NH\text{-}(R_5\text{-}NH\text{-}CO\text{-}O)_q\text{-}R_6\text{-}O\text{-}CO\text{-}R_4 \qquad (IV)$$

$$-[CO\text{-}NH\text{-}(R_5\text{-}NH\text{-}CO\text{-}O)_q\text{-}R_6\text{-}O]_p\text{-}CO\text{-}R_4 \qquad (V)$$

in which p and q, independently of one another, are zero or one, and R_5 and R_6, independently of one another, are lower alkylene having 2 to 8 carbon atoms, arylene having 6 to 12 carbon atoms, a saturated bivalent cycloaliphatic group having 6 to 10 carbon atoms, arylenealkylene or alkylenearylene having 7 to 14 carbon atoms or arylenealkylenearylene having 13 to 16 carbon atoms, and in which R_4 is an olefinically unsaturated copolymerizable radical having 2 to 24 carbone atoms, preferably having 2 to 8 carbonatoms, more preferably having 2 to 4 carbon atoms.

5. A polymerizable material of claim 3, wherein said modifier is composed of the nanopaticles having a hydrophilic surface.
6. A polymerizable material of claim 5, wherein the nanoparticles are nano-sized silica fillers.
7. A polymerizable material of claim 3, wherein said modifier is composed of one or more copolymers each having hydrophobic groups or units for imparting at least one desired physical property to said ophthalmic device and hydrophilic groups or units in an amount sufficient to render the copolymer miscible with the crosslinkable polyvinyl alcohol.
8. A polymerizable material of claim 7, wherein said modifier is a N-vinyl lactam copolymer which is a copolymerization product of at least one N-vinyl lactam with one or more hydrophobic monomer, wherein said at least one N-vinyl lactam has a structure of formula (VI)



(VI)

in which R_{19} is an alkylene di-radical having from 2 to 8 carbon atoms, R_{20} is hydrogen, C_1-C_7 alkyl, aryl having up to 10 carbon atoms, aralkyl or alkaryl having up to 14 carbon atoms, and R_{21} is hydrogen or lower alkyl having up to 7 carbon atoms.

9. A polymerizable material of claim 8, wherein said N-vinyl lactam is N-vinyl pyrrolidone.
10. A polymerizable material of claim 7, wherein said modifier is a N,N-dialkylmethacrylamide copolymer which is a copolymerization product of a N,N-di-C_2-C_4 alkyl methacrylamide with at least one hydrophobic monomer.
11. A polymerizable material of claim 10, wherein the N,N-di-C_2-C_4 alkyl methacrylamide is N,N-dimethylmethacrylamide.
12. A polymerizable material of claim 7, wherein said modifier is a non-crosslinkable polyurethane having a molecular weight of at least about 2000, or a crosslinkable polyurethane.
13. A polymerizable material of claim 12, wherein said non-crosslinkable polyurethane is the reaction product of an isocyanate-capped polyurethane with water and amine, wherein said crosslinkable polyurethane is the reaction product of the isocyanate-capped polyurethane with an ethylenically unsaturated amine (primary or secondary amine) or an

ethylenically unsaturated monohydroxy compound, wherein said isocyanate-capped polyurethane is a copolymerization product of

(a) at least one polyalkylene glycol of formula

$$HO\text{-}(R_9\text{-}O)_n\text{-}(R_{10}\text{-}O)_m\text{-}(R_{11}\text{-}O)_l\text{-}H \qquad (1)$$

wherein R_9, R_{10}, and R_{11}, independently of one other, are each linear or branched C_2-C_4-alkylene, and n, m and l, independently of one another, are each a number from 0 to 100, wherein the sum of (n+m+l) is 5 to 100,

(b) at least one branching agent selected from the group consisting of

(i) a linear or branched aliphatic polyhydroxy compound of formula

$$R_{12}\text{-}(OH)_x \qquad (2),$$

wherein R_{12} is a linear or branched C_3-C_{18} aliphatic multi-valent radical and x is a number ≥ 3,

(ii) a polyether polyol, which is the polymerization product of a compound of formula (2) and a glycol,

(iii) a polyester polyol, which is the polymerization product of a compound of formula (2), a dicarboxylic acid or a derivative thereof and a diol, and

(iv) a cycloaliphatic polyol selected from the group consisting of a C_5-C_8-cycloalkane which is substituted by ≥ 3 hydroxy groups and which is unsubstituted by alkyl radical, a C_5-C_8-cycloalkane which is substituted by ≥ 3 hydroxy groups and which is substituted by one ore more C_1-C_4 alkyl radicals, and an unsubstituted mono- and disaccharide,

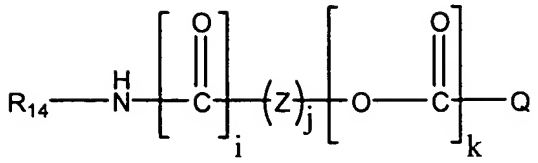
(v) an aralkyl polyol having at least three hydroxy C_1-C_4 alkyl radicals, and

(c) at least one di- or polyisocyanate of formula

$$R_{13}\text{-}(NCO)_y \qquad (3)$$

wherein R_{13} the multivalent radical of a linear or branched C_3-C_{24} aliphatic polyisocyanate, the multivalent radical of a C_3-C_{24} cycloaliphatic or aliphatic-cycloaliphatic polyisocyanate, or the multivalent radical of a C_3-C_{24} aromatic or araliphatic polyisocyanate, and y is a number from 2 to 6,

wherein said ethylenically unsaturated monohydroxy compound is a hydroxy-substituted lower alkylacrylate, a hydroxy-substituted lower alkylmethacrylate, a hydroxy-substituted lower alkyl-acrylamides, a hydroxy-substituted lower alkyl-methacrylamide, or a hydroxy-substituted lower alkylvinylether, wherein said ethylenically unsaturated amine has formula (4), (4') or (4")



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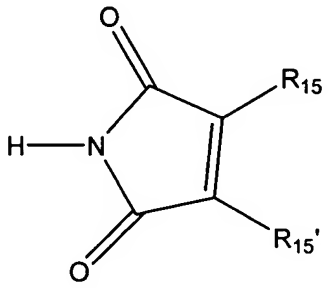

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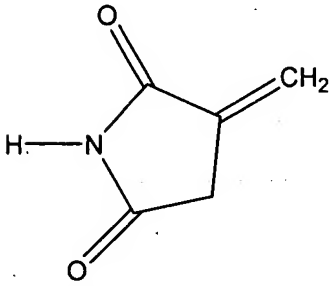


(4")

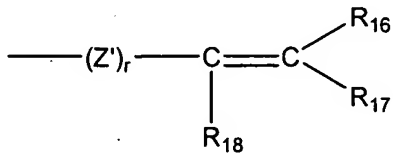
In which, i, j and k, independent of one another, are o or 1;

R_{14} is hydrogen, a linear or branched C_1-C_{24} alkyl, a C_2-C_{24} alkoxyalkyl, a C_2-C_{24} alkylcarbonyl, a C_2-C_{24} alkoxycarbonyl, an unsubstituted or C_1-C_4 alkyl- or C_1-C_4 alkoxy-substituted C_6-C_{10} aryl, a C_7-C_{18} aralkyl, a C_{13}-C_{22} arylalkylaryl, a C_3-C_8 cycloalkyl, a C_4-C_{14} cycloalkylalkyl, a C_7-C_{18} cycloalkylalkylcycloalkyl, a C_5-C_{20} alkylcycloalkylalkyl, or an aliphatic-heterocyclic radical;

Z is a C_1-C_{12} alkylene radical, phenylene radical or C_7-C_{12} aralkylene radical;

R_{15} and R_{15}', independently of each other, are hydrogen, C_1-C_4 alkyl or halogen; and

Q is a radical of formula (5)



(5)

wherein r is the number 0 or 1,

each of R_{16} and R_{17} independently of the other is hydrogen, C_1-C_4 alkyl, phenyl, carboxy or halogen,

R_{18} is hydrogen, C_1-C_4 alkyl or halogen, and

Z' is a linear or branched C_1-C_{12} alkylene, an unsubstituted phenylene, an C_1-C_4 alkyl- or C_1-C_4 alkoxy-substituted phenylene, or a C_7-C_{12} aralkylene.

14. A polymerizable material of claim 13, wherein component (a) consists of one or more polyalkylene glycols of formula (1a)

$$HO\text{-}(CH_2\text{-}CH_2\text{-}O)_n\text{-}(CHY_1\text{-}CHY_2\text{-}O)_m\text{-}H \qquad (1a)$$

wherein one of radicals Y_1 and Y_2 signifies methyl and the other radical signifies hydrogen, and n and m, independently of one another, each denote a number from 0 to 50, wherein the sum of (n+m) is 8 to 50,

wherein component (b) consists of one or more linear or branched aliphatic polyhydroxy compounds of formula (2), in which x is a number from 3 to 8,

wherein component (c) consists of one or more diisocyanates of formula (3a)

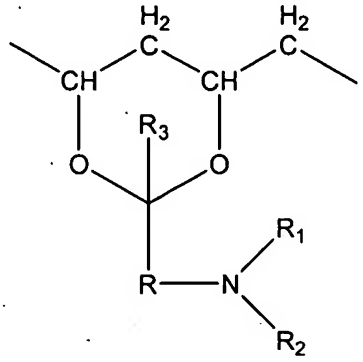
$$OCN\text{-}R_5\text{-}NCO \qquad (3a)$$

wherein R_5 is a linear or branched C_3-C_{18}-alkylene, an unsubstituted or C_1-C_4-alkyl-substituted or C_1-C_4-alkoxy-substituted C_6-C_{10}-arylene, a C_7-C_{18}-aralkylene, a C_6-C_{10}-arylene-C_1-C_2-alkylene-C_6-C_{10}-arylene, a C_3-C_8-cyclo-alkylene, a C_3-C_8-cycloalkylene-C_1-C_6-alkylene, a C_3-C_8-cycloalkylene-C_1-C_2-alkylene-C_3-C_8-cycloalkylene, or a C_1-C_6-alkylene-C_3-C_8-cycloalkylene-C_1-C_6-alkylene,

wherein said ethylenically unsaturated amine is selected from the group consisting of mono-C_1-C_4 alkylamino-C_1-C_4 alkyl-acrylates, mono-C_1-C_4 alkylamino-C_1-C_4 alkyl-methacrylates, di- C_1-C_4 alkylamino- C_1-C_4 alkyl-acrylates and di- C_1-C_4 alkylamino- C_1-C_4 alkyl-methacrylates, and wherein said ethylenically unsaturated hydroxy compound is selected from the group consisting of hydroxy-substituted C_1-C_6 alkylacrylates and hydroxy-substituted C_1-C_6 alkylmethacrylates.

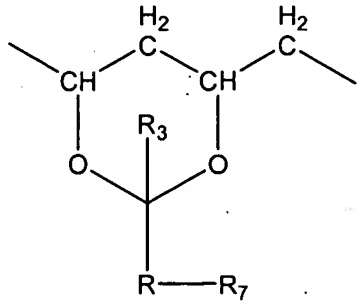
15. A polymerizable material of claim 14, wherein said ethylenically unsaturated amine is 2-terbutylaminoethylmethacrylate or 2-terbutylaminoethylacrylate, wherein said ethylenically unsaturated hydroxy compound is 2-hydroxyethylmethacrylate or 2-hydroxyehtylcrylate, wherein component (c) consists of a diisocyanate selected from the group consisting isophorone diisocyanate (IPDI), toluylene-2,4-diisocyanate (TDI), methylenebis(cyclohexyl-isocyanate), 1,6-diisocyanato-2,2,4-trimethyl-n-hexane (TMDI), methylenebis(phenyl-isocyanate) and hexamethylene-diisocyanate (HMDI).
16. A polymeric article obtained by curing a polymerizable material of claim 2 in a mold.
17. A polymeric article of claim 16, wherein said polymeric article is an ophthalmic device.

18. An ophthalmic device of claim 17, wherein said ophthalmic device is a contact lens.
19. A contact lens of claim 18, wherein said water-soluble polyvinyl alcohol is a polyhydroxyl compound which has a weight average molecular weight of at least about 2000 and which comprises from about 0.5 to about 80%, based on the number of hydroxyl groups in the poly(vinyl alcohol), of units of the formula I, I and II, I and III, or I and II and III



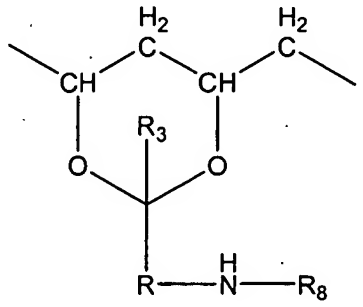
I

in which R is alkylene having up to 12 carbon atoms, R_1 is hydrogen or lower alkyl, R_2 is an olefinically unsaturated, electron-withdrawing, crosslinkable radical having up to 25 carbon atoms, and R_3 is hydrogen, a C_1 -C_6 alkyl group or a cycloalkyl group,



II

wherein R and R_3 are as defined above, and R_7 is a primary, secondary or tertiary amino group or a quaternary amino group of the formula $N^+(R')_3X^-$, in which each R', independently of the others, is hydrogen or a C_1 -C_4 alkyl radical and X is HSO_4^-, F^-, Cl^-, Br^-, I^-, CH_3COO^-, OH^-, BF^-, or $H_2PO_4^-$,



III

in which R and R_3 are as defined above, and R_8 is the radical of a monobasic, dibasic or tribasic, saturated or unsaturated, aliphatic or aromatic organic acid or sulfonic acid.

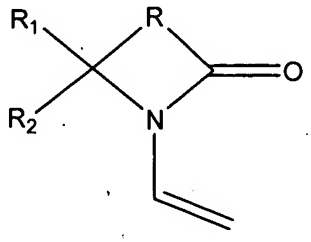
20. A contact lens of claim 19, wherein said water-soluble polyvinyl alcohol is a polyhydroxyl compound which has a molecular weight of at least about 2000 and which comprises from about 0.5 to about 80%, based on the number of hydroxyl groups in the poly(vinyl alcohol), of units of the formula I, wherein R_2 is a radical of formula IV or formula V

$$-CO-NH-(R_5-NH-CO-O)_q-R_6-O-CO-R_4 \qquad (IV)$$

$$-[CO-NH-(R_5-NH-CO-O)_q-R_6-O]_p-CO-R_4 \qquad (V)$$

in which p and q, independently of one another, are zero or one, and R_5 and R_6, independently of one another, are lower alkylene having 2 to 8 carbon atoms, arylene having 6 to 12 carbon atoms, a saturated bivalent cycloaliphatic group having 6 to 10 carbon atoms, arylenealkylene or alkylenearylene having 7 to 14 carbon atoms or arylenealkylenearylene having 13 to 16 carbon atoms, and in which R_4 is an olefinically unsaturated copolymerizable radical having 2 to 24 carbone atoms, preferably having 2 to 8 carbonatoms, more preferably having 2 to 4 carbon atoms.

21. A contact lens of claim 19, wherein said modifier is composed of the nanopaticles having a hydrophilic surface.
22. A contact lens of claim 21, wherein the nanoparticles are nano-sized silica fillers.
23. A contact lens of claim 19, wherein said modifier is composed of one or more copolymers each having hydrophobic groups or units for imparting at least one desired physical property to said ophthalmic device and hydrophilic groups or units in an amount sufficient to render the copolymer miscible with the crosslinkable polyvinyl alcohol.
24. A contact lens of claim 23, wherein said modifier is a N-vinyl lactam copolymer which is a copolymerization product of at least one N-vinyl lactam with one or more hydrophobic monomer, wherein said at least one N-vinyl lactam has a structure of formula (VI)



(VI)

in which R_{19} is an alkylene di-radical having from 2 to 8 carbon atoms, R_{20} is hydrogen, C_1-C_7 alkyl, aryl having up to 10 carbon atoms, aralkyl or alkaryl having up to 14 carbon atoms, and R_{21} is hydrogen or lower alkyl having up to 7 carbon atoms.

25. A contact lens of claim 24, wherein said N-vinyl lactam is N-vinyl pyrrolidone.

26. A contact lens of claim 23, wherein said modifier is a N,N-dialkylmethacrylamide copolymer which is a copolymerization product of a N,N-di-C_2-C_4 alkyl methacrylamide with at least one hydrophobic monomer.
27. A contact lens of claim 26, wherein the N,N-di-C_2-C_4 alkyl methacrylamide is N,N-dimethylmethacrylamide.
28. A contact lens of claim 23, wherein said modifier is a non-crosslinkable polyurethane having a molecular weight of at least about 2000, or a crosslinkable polyurethane.
29. A contact lens of claim 28, wherein said non-crosslinkable polyurethane is the reaction product of an isocyanate-capped polyurethane with water and amine, wherein said crosslinkable polyurethane is the reaction product of the isocyanate-capped polyurethane with an ethylenically unsaturated amine (primary or secondary amine) or an ethylenically unsaturated monohydroxy compound, wherein said isocyanate-capped polyurethane is a copolymerization product of

(a) at least one polyalkylene glycol of formula

$$HO\text{-}(R_9\text{-}O)_n\text{-}(R_{10}\text{-}O)_m\text{-}(R_{11}\text{-}O)_l\text{-}H \qquad (1)$$

wherein R_9, R_{10}, and R_{11}, independently of one other, are each linear or branched C_2-C_4-alkylene, and n, m and l, independently of one another, are each a number from 0 to 100, wherein the sum of (n+m+l) is 5 to 100,

(b) at least one branching agent selected from the group consisting of

(i) a linear or branched aliphatic polyhydroxy compound of formula

$$R_{12}\text{-}(OH)_x \qquad (2),$$

wherein R_{12} is a linear or branched C_3-C_{18} aliphatic multi-valent radical and x is a number ≥ 3,

(ii) a polyether polyol, which is the polymerization product of a compound of formula (2) and a glycol,

(iii) a polyester polyol, which is the polymerization product of a compound of formula (2), a dicarboxylic acid or a derivative thereof and a diol, and

(iv) a cycloaliphatic polyol selected from the group consisting of a C_5-C_8-cycloalkane which is substituted by ≥ 3 hydroxy groups and which is unsubstituted by alkyl radical, a C_5-C_8-cycloalkane which is substituted by ≥ 3 hydroxy groups and which is substituted by one ore more C_1-C_4 alkyl radicals, and an unsubstituted mono- and disaccharide,

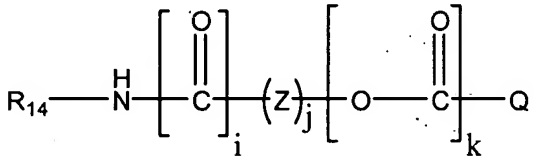
(v) an aralkyl polyol having at least three hydroxy C_1-C_4 alkyl radicals, and

(c) at least one di- or polyisocyanate of formula

R_{13}-$(NCO)_y$ (3)

wherein R_{13} the multivalent radical of a linear or branched C_3-C_{24} aliphatic polyisocyanate, the multivalent radical of a C_3-C_{24} cycloaliphatic or aliphatic-cycloaliphatic polyisocyanate, or the multivalent radical of a C_3-C_{24} aromatic or araliphatic polyisocyanate, and y is a number from 2 to 6,

wherein said ethylenically unsaturated monohydroxy compound is a hydroxy-substituted lower alkylacrylate, a hydroxy-substituted lower alkylmethacrylate, a hydroxy-substituted lower alkyl-acrylamides, a hydroxy-substituted lower alkyl-methacrylamide, or a hydroxy-substituted lower alkylvinylether, wherein said ethylenically unsaturated amine has formula (4), (4') or (4")



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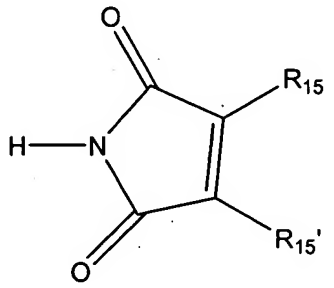

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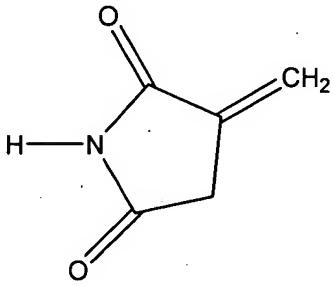


(4")

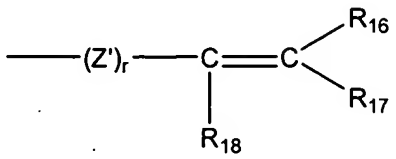
In which, l, j and k, independent of one another, are o or 1;

R_{14} is hydrogen, a linear or branched C_1-C_{24} alkyl, a C_2-C_{24} alkoxyalkyl, a C_2-C_{24} alkylcarbonyl, a C_2-C_{24} alkoxycarbonyl, an unsubstituted or C_1-C_4 alkyl- or C_1-C_4 alkoxy-substituted C_6-C_{10} aryl, a C_7-C_{18} aralkyl, a C_{13}-C_{22} arylalkylaryl, a C_3-C_8 cycloalkyl, a C_4-C_{14} cycloalkylalkyl, a C_7-C_{18} cycloalkylalkylcycloalkyl, a C_5-C_{20} alkylcycloalkylalkyl, or an aliphatic-heterocyclic radical;

Z is a C_1-C_{12} alkylene radical, phenylene radical or C_7-C_{12} aralkylene radical;

R_{15} and R_{15}', independently of each other, are hydrogen, C_1-C_4 alkyl or halogen; and

Q is a radical of formula (5)



(5)

wherein r is the number 0 or 1,

each of R_{16} and R_{17} independently of the other is hydrogen, C_1-C_4 alkyl, phenyl, carboxy or halogen,

R_{18} is hydrogen, C_1-C_4 alkyl or halogen, and

Z' is a linear or branched C_1-C_{12} alkylene, an unsubstituted phenylene, an C_1-C_4 alkyl- or C_1-C_4 alkoxy-substituted phenylene, or a C_7-C_{12} aralkylene.

30. A contact lens of claim 29, wherein component (a) consists of one or more polyalkylene glycols of formula (1a)

$$HO\text{-}(CH_2\text{-}CH_2\text{-}O)_n\text{-}(CHY_1\text{-}CHY_2\text{-}O)_m\text{-}H \qquad (1a)$$

wherein one of radicals Y_1 and Y_2 signifies methyl and the other radical signifies hydrogen, and n and m, independently of one another, each denote a number from 0 to 50, wherein the sum of (n+m) is 8 to 50,

wherein component (b) consists of one or more linear or branched aliphatic polyhydroxy compounds of formula (2), in which x is a number from 3 to 8,

wherein component (c) consists of one or more diisocyanates of formula (3a)

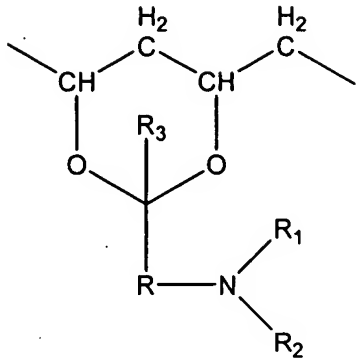
$$OCN\text{-}R_5\text{-}NCO \qquad (3a)$$

wherein R_5 is a linear or branched C_3-C_{18}-alkylene, an unsubstituted or C_1-C_4-alkyl-substituted or C_1-C_4-alkoxy-substituted C_6-C_{10}-arylene, a C_7-C_{18}-aralkylene, a C_6-C_{10}-arylene-C_1-C_2-alkylene-C_6-C_{10}-arylene, a C_3-C_8-cyclo-alkylene, a C_3-C_8-cycloalkylene-C_1-C_6-alkylene, a C_3-C_8-cycloalkylene-C_1-C_2-alkylene-C_3-C_8-cycloalkylene, or a C_1-C_6-alkylene-C_3-C_8-cycloalkylene-C_1-C_6-alkylene,

wherein said ethylenically unsaturated amine is selected from the group consisting of mono-C_1-C_4 alkylamino-C_1-C_4 alkyl-acrylates, mono-C_1-C_4 alkylamino-C_1-C_4 alkyl-methacrylates, di- C_1-C_4 alkylamino- C_1-C_4 alkyl-acrylates and di- C_1-C_4 alkylamino- C_1-C_4 alkyl-methacrylates, and wherein said ethylenically unsaturated hydroxy compound is

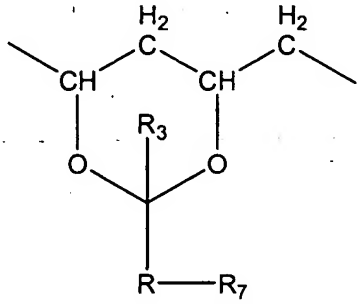
selected from the group consisting of hydroxy-substituted C_1-C_6 alkylacrylates and hydroxy-substituted C_1-C_6 alkylmethacrylates.

31. A contact lens of claim 30, wherein said ethylenically unsaturated amine is 2-terbutylaminoethylmethacrylate or 2-terbutylaminoethylacrylate, wherein said ethylenically unsaturated hydroxy compound is 2-hydroxyethylmethacrylate or 2-hydroxyehtylcrylate, wherein component (c) consists of a diisocyanate selected from the group consisting isophorone diisocyanate (IPDI), toluylene-2,4-diisocyanate (TDI), methylenebis(cyclohexyl-isocyanate), 1,6-diisocyanato-2,2,4-trimethyl-n-hexane (TMDI), methylenebis(phenyl-isocyanate) and hexamethylene-diisocyanate (HMDI).
32. A method for making an ophthalmic device, comprising the steps of:
    (I) introducing a polymerizable material comprising a water-soluble polyvinyl alcohol having crosslinkable groups, a modifier in an amount sufficient to improve one or more physical properties of the ophthalmic device made from the polymerizable material, and optionally a photo-initiator, into a mold, wherein said modifier is selected from the group consisting of nanoparticles having a hydrophilic surface, a copolymer having hydrophobic groups or units for imparting at least one desired physical property to said ophthalmic device and hydrophilic groups or units in an amount sufficient to render the copolymer miscible with the polyvinyl alcohol, and mixtures thereof, wherein the one or more physical properties are selected from the group consisting of stress at break (N/mm^2), percentage of elongation at break, toughness or energy to break (N·mm), and susceptibility to fracture;
    (II) crosslinking by actinic radiation the polymerizable material; and
    (III) opening the mold so that the ophthalmic device can be removed from the mold.
33. A method of claim 32, wherein said water-soluble polyvinyl alcohol is a polyhydroxyl compound which has a weight average molecular weight of at least about 2000 and which comprises from about 0.5 to about 80%, based on the number of hydroxyl groups in the poly(vinyl alcohol), of units of the formula I, I and II, I and III, or I and II and III



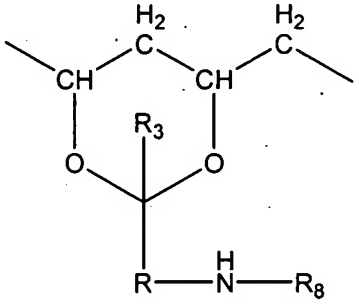
I

in which R is alkylene having up to 12 carbon atoms, R_1 is hydrogen or lower alkyl, R_2 is an olefinically unsaturated, electron-withdrawing, crosslinkable radical having up to 25 carbon atoms, and R_3 is hydrogen, a C_1 -C_6 alkyl group or a cycloalkyl group,



II

wherein R and R_3 are as defined above, and R_7 is a primary, secondary or tertiary amino group or a quaternary amino group of the formula $N^+(R')_3X^-$, in which each R', independently of the others, is hydrogen or a C_1 -C_4 alkyl radical and X is HSO_4^-, F^-, Cl^-, Br^-, I^-, CH_3COO^-, OH^-, BF^-, or $H_2PO_4^-$,



III

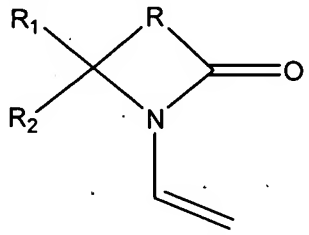
in which R and R_3 are as defined above, and R_8 is the radical of a monobasic, dibasic or tribasic, saturated or unsaturated, aliphatic or aromatic organic acid or sulfonic acid.

34. A method of claim 33, wherein said modifier is composed of the nanopaticles having a hydrophilic surface.

35. A method of claim 33, wherein said modifier is composed of one or more copolymers each having hydrophobic groups or units for imparting at least one desired physical

property to said ophthalmic device and hydrophilic groups or units in an amount sufficient to render the copolymer miscible with the crosslinkable polyvinyl alcohol.

36. A method of claim 35, wherein said modifier is a N-vinyl lactam copolymer which is a copolymerization product of at least one N-vinyl lactam with one or more hydrophobic monomer, wherein said at least one N-vinyl lactam has a structure of formula (VI)



(VI)

in which R_{19} is an alkylene di-radical having from 2 to 8 carbon atoms, R_{20} is hydrogen, C_1-C_7 alkyl, aryl having up to 10 carbon atoms, aralkyl or alkaryl having up to 14 carbon atoms, and R_{21} is hydrogen or lower alkyl having up to 7 carbon atoms.

37. A method of claim 35, wherein said modifier is a N,N-dialkylmethacrylamide copolymer which is a copolymerization product of a N,N-di-C_2-C_4 alkyl methacrylamide with at least one hydrophobic monomer.

38. A method of claim 35, wherein said modifier is a non-crosslinkable polyurethane having a molecular weight of at least about 2000, or a crosslinkable polyurethane.

39. A method of claim 38, wherein said non-crosslinkable polyurethane is the reaction product of an isocyanate-capped polyurethane with water and amine, wherein said crosslinkable polyurethane is the reaction product of the isocyanate-capped polyurethane with an ethylenically unsaturated amine (primary or secondary amine) or an ethylenically unsaturated monohydroxy compound, wherein said isocyanate-capped polyurethane is a copolymerization product of

(a) at least one polyalkylene glycol of formula

$$HO\text{-}(R_9\text{-}O)_n\text{-}(R_{10}\text{-}O)_m\text{-}(R_{11}\text{-}O)_l\text{-}H \qquad (1)$$

wherein R_9, R_{10}, and R_{11}, independently of one other, are each linear or branched C_2-C_4-alkylene, and n, m and l, independently of one another, are each a number from 0 to 100, wherein the sum of (n+m+l) is 5 to 100,

(b) at least one branching agent selected from the group consisting of

(i) a linear or branched aliphatic polyhydroxy compound of formula

$$R_{12}\text{-}(OH)_x \qquad (2),$$

wherein R_{12} is a linear or branched C_3-C_{18} aliphatic multi-valent radical and x is a number ≥ 3,

(ii) a polyether polyol, which is the polymerization product of a compound of formula (2) and a glycol,

(iii) a polyester polyol, which is the polymerization product of a compound of formula (2), a dicarboxylic acid or a derivative thereof and a diol, and

(iv) a cycloaliphatic polyol selected from the group consisting of a C_5-C_8-cycloalkane which is substituted by ≥ 3 hydroxy groups and which is unsubstituted by alkyl radical, a C_5-C_8-cycloalkane which is substituted by ≥ 3 hydroxy groups and which is substituted by one ore more C_1-C_4 alkyl radicals, and an unsubstituted mono- and disaccharide,

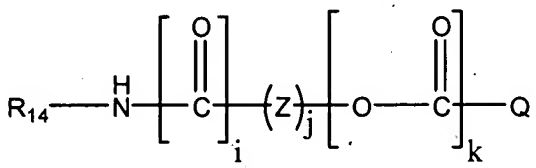
(v) an aralkyl polyol having at least three hydroxy C_1-C_4 alkyl radicals, and

(c) at least one di- or polyisocyanate of formula

$$R_{13}\text{-}(NCO)_y \qquad (3)$$

wherein R_{13} the multivalent radical of a linear or branched C_3-C_{24} aliphatic polyisocyanate, the multivalent radical of a C_3-C_{24} cycloaliphatic or aliphatic-cycloaliphatic polyisocyanate, or the multivalent radical of a C_3-C_{24} aromatic or araliphatic polyisocyanate, and y is a number from 2 to 6,

wherein said ethylenically unsaturated monohydroxy compound is a hydroxy-substituted lower alkylacrylate, a hydroxy-substituted lower alkylmethacrylate, a hydroxy-substituted lower alkyl-acrylamides, a hydroxy-substituted lower alkyl-methacrylamide, or a hydroxy-substituted lower alkylvinylether, wherein said ethylenically unsaturated amine has formula (4), (4') or (4")



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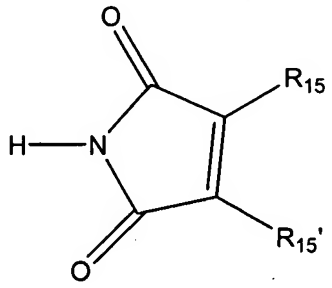

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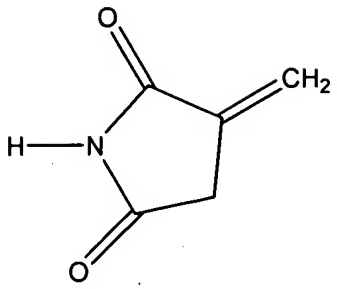


(4")

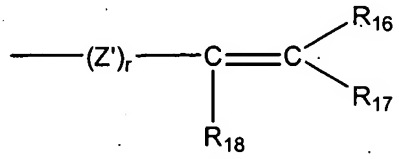
In which, l, j and k, independent of one another, are o or 1;

R_{14} is hydrogen, a linear or branched C_1-C_{24} alkyl, a C_2-C_{24} alkoxyalkyl, a C_2-C_{24} alkylcarbonyl, a C_2-C_{24} alkoxycarbonyl, an unsubstituted or C_1-C_4 alkyl- or C_1-C_4 alkoxy-substituted C_6-C_{10} aryl, a C_7-C_{18} aralkyl, a C_{13}-C_{22} arylalkylaryl, a C_3-C_8 cycloalkyl, a C_4-C_{14} cycloalkylalkyl, a C_7-C_{18} cycloalkylalkylcycloalkyl, a C_5-C_{20} alkylcycloalkylalkyl, or an aliphatic-heterocyclic radical;

Z is a C_1-C_{12} alkylene radical, phenylene radical or C_7-C_{12} aralkylene radical;

R_{15} and R_{15}', independently of each other, are hydrogen, C_1-C_4 alkyl or halogen; and

Q is a radical of formula (5)



(5)

wherein r is the number 0 or 1,

each of R_{16} and R_{17} independently of the other is hydrogen, C_1-C_4 alkyl, phenyl, carboxy or halogen,

R_{18} is hydrogen, C_1-C_4 alkyl or halogen, and

Z' is a linear or branched C_1-C_{12} alkylene, an unsubstituted phenylene, an C_1-C_4 alkyl- or C_1-C_4 alkoxy-substituted phenylene, or a C_7-C_{12} aralkylene.

40. A method of claim 39, wherein component (a) consists of one or more polyalkylene glycols of formula (1a)

$$HO\text{-}(CH_2\text{-}CH_2\text{-}O)_n\text{-}(CHY_1\text{-}CHY_2\text{-}O)_m\text{-}H \qquad (1a)$$

wherein one of radicals Y_1 and Y_2 signifies methyl and the other radical signifies hydrogen, and n and m, independently of one another, each denote a number from 0 to 50, wherein the sum of (n+m) is 8 to 50,

wherein component (b) consists of one or more linear or branched aliphatic polyhydroxy compounds of formula (2), in which x is a number from 3 to 8,

wherein component (c) consists of one or more diisocyanates of formula (3a)

$$OCN\text{-}R_5\text{-}NCO \qquad (3a)$$

wherein R_5 is a linear or branched C_3-C_{18}-alkylene, an unsubstituted or C_1-C_4-alkyl-substituted or C_1-C_4-alkoxy-substituted C_6-C_{10}-arylene, a C_7-C_{18}-aralkylene, a C_6-C_{10}-arylene-C_1-C_2-alkylene-C_6-C_{10}-arylene, a C_3-C_8-cyclo-alkylene, a C_3-C_8-cycloalkylene-C_1-C_6-alkylene, a C_3-C_8-cycloalkylene-C_1-C_2-alkylene-C_3-C_8-cycloalkylene, or a C_1-C_6-alkylene-C_3-C_8-cycloalkylene-C_1-C_6-alkylene,

wherein said ethylenically unsaturated amine is selected from the group consisting of mono-C_1-C_4 alkylamino-C_1-C_4 alkyl-acrylates, mono-C_1-C_4 alkylamino-C_1-C_4 alkyl-methacrylates, di- C_1-C_4 alkylamino- C_1-C_4 alkyl-acrylates and di- C_1-C_4 alkylamino- C_1-C_4 alkyl-methacrylates, and wherein said ethylenically unsaturated hydroxy compound is selected from the group consisting of hydroxy-substituted C_1-C_6 alkylacrylates and hydroxy-substituted C_1-C_6 alkylmethacrylates.

41. A method of claim 40, wherein said ethylenically unsaturated amine is 2-terbutylaminoethylmethacrylate or 2-terbutylaminoethylacrylate, wherein said ethylenically unsaturated hydroxy compound is 2-hydroxyethylmethacrylate or 2-hydroxyehtylcrylate, wherein component (c) consists of a diisocyanate selected from the group consisting isophorone diisocyanate (IPDI), toluylene-2,4-diisocyanate (TDI), methylenebis(cyclohexyl-isocyanate), 1,6-diisocyanato-2,2,4-trimethyl-n-hexane (TMDI), methylenebis(phenyl-isocyanate) and hexamethylene-diisocyanate (HMDI).

42. A method for modifying one or more physical properties of a hydrogel article obtained from the polymerization of a crosslinkable polymer, comprising the steps of:

(I) adding, into a solution of said crosslinkable polymer, a modifier in an amount sufficient to modify said one or more physical properties of said polymeric article, wherein said modifier is selected from the group consisting of nanoparticles having a hydrophilic surface, a copolymer having hydrophobic groups or units for imparting at least one desired physical property to said hydrogel article and hydrophilic groups or units in an amount sufficient to render it miscible with the crosslinkable polymer, and mixtures thereof;

(II) mixing thoroughly said modifier and the crosslinkable polymer; and

(III) crosslinking said crosslinkable polymer in the presence of the modifier to obtain said hydrogel article, wherein the one or more physical properties are selected from the group consisting of stress at break (N/mm^2), percentage of elongation at break, toughness or energy to break (N·mm), and susceptibility to fracture.

43. A method of claim 42, wherein said modifier is composed of the nanopaticles having a hydrophilic surface..

44. A method of claim 43, wherein said modifier is composed of the nanopaticles having a hydrophilic surface.

45. A method of claim 42, wherein said modifier is composed of one or more copolymers each having hydrophobic groups or units for imparting at least one desired physical property to said ophthalmic device and hydrophilic groups or units in an amount sufficient to render the copolymer miscible with the crosslinkable polymer.

46. A method of claim 35, wherein each of said one or more copolymers is a polymerization product of at least one hydrophilic monomer and at least one hydrophobic monomer, wherein said hydrophilic is present in an amount sufficient to impart a desired miscibility with the crosslinkable polymer.